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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,146	12/21/2001	Richard P. Volant	FIS920010219US1	8227

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INTERNATIONAL BUSINESS MACHINES CORPORATION  
DEPT. 18G  
BLDG. 300-482  
2070 ROUTE 52  
HOPEWELL JUNCTION, NY 12533

[REDACTED] EXAMINER

VU, HUNG K

[REDACTED] ART UNIT [REDACTED] PAPER NUMBER

2811

DATE MAILED: 09/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/026,146	VOLANT ET AL.	
	Examiner Hung K. Vu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on 30 June 2003.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-15 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-15 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
 If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All
  - b) Some \*
  - c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### *Claim Objections*

1. Claims 1-3, 7 and 9 are objected to because of the following informalities:

In claim 1, line 7, between “third conductors” insert --electrical-- for clarity.

In claim 1, line 11, between “third conductor” insert --electrical-- for clarity.

In claim 2, line 2, between “third conductors” insert --electrical-- for clarity.

In claim 2, line 2, between “first conductor” insert --electrical-- for clarity.

In claim 2, line 3, between “second conductor” insert --electrical-- for clarity.

In claim 3, line 2, between “third conductors” insert --electrical-- for clarity.

In claim 3, line 2, between “first conductor” insert --electrical-- for clarity.

In claim 3, line 2, between “second conductor” insert --electrical-- for clarity.

In claim 3, line 4, between “third conductor” insert --electrical-- for clarity.

In claim 7, line 2, “a thickness” should be changed to “the thickness” for clarity.

In claim 9, line 7, between “third conductor” insert --electrical-- for clarity.

Appropriate correction is required.

2. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Note that the independent claim 1 defines the third electrical conductor has a thickness in a range of approximately two to less than five microns, but the

dependent claim 7 defines the thickness in the range of approximately five to approximately 10 microns.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhao et al. (PN 5,861,647, of record).

Zhao et al. discloses, as shown in Figures 7 and 8, a passive electrical device comprising:

a first electrical conductor (20);  
a second electrical conductor (52) disposed over the first electrical conductor;  
a third electrical conductor (48) connecting the first electrical conductor to the second electrical conductor, wherein the first, second and third electrical conductors are disposed on a semiconductor substrate (28,30) and wherein the sheet resistivity of the first electrical conductor is approximately equal to the sheet resistivity of the second electrical conductor. Note that the first and the second electrical conductors comprise the same material, it is inherent that the sheet resistivity of the first electrical conductor is approximately equal to that of the second electrical conductor [see Col. 3, lines 2-6 and 56-57];

wherein the third electrical conductor has a thickness in a range of 2.3 microns (within the range of approximately two to less than five microns) [see Col. 3, lines 23-27, note that the

third electrical conductor 48 is formed in the dielectric layer 36 which is the combination of layers 38, 40 and 42, having the thickness as claimed].

With regard to claim 4, Zhao et al. discloses the first, second and third electrical conductors consist essentially of copper [see Col. 3, lines 2-6, 39-43 and 56-57].

With regard to claim 5, Zhao et al. discloses the first and third electrical conductors consist essentially of copper, and the second electrical conductor consists essentially of aluminum [see Col. 3, lines 2-6, 39-43 and 56-57].

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1-8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Zhao et al. (PN 5,861,647, of record).

Wen et al. discloses, as shown in Figures 12 and 13, a passive electrical device comprising:

a first electrical conductor (20);

a second electrical conductor (28) disposed over the first electrical conductor;

a third electrical conductor (26) connecting the first electrical conductor to the second electrical conductor, wherein the first, second and third electrical conductors are disposed on a

semiconductor substrate (14) and wherein the sheet resistivity of the first electrical conductor is approximately equal to the sheet resistivity of the second electrical conductor. Note that the first and the second electrical conductors comprise the same material (copper), it is inherent that the sheet resistivity of the first electrical conductor is approximately equal to that of the second electrical conductor [see Col. 3, lines 5-14 and 53-65].

Wen et al. discloses the third electrical conductor has a thickness in a range of approximately 5 to 10 microns [see Col. 3, lines 39-41, note that the third electrical conductor 26 is formed in the dielectric layer 24 having the thickness as claimed]. Wen et al. does not disclose the thickness of the third electrical conductor is approximately 2 to less than 5 microns. However, Zhao et al. discloses a device comprising a third electrical conductor (48) having a thickness in a range of 2.3 microns (within the range of approximately two to less than five microns) [see Figures 7-8 and Col. 3, lines 23-27, note that the third electrical conductor 48 is formed in the dielectric layer 36 which is the combination of layers 38, 40 and 42, having the thickness as claimed].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the third electrical conductor of Wen et al. having the thickness as claimed, such as taught by Zhao et al. in order to reduce the coupling capacitance between the first and second electrical conductors.

With regard to claim 2, Wen et al. and Zhao et al. disclose each of the first, second and third electrical conductors has a respective thickness, and the thickness of the first electrical conductor is approximately equal to the thickness of the second electrical conductor [see Col. 3, lines 5-14 and 53-65].

With regard to claim 3, Wen et al. and Zhao et al. disclose each of the first, second and third electrical conductors has a respective thickness, and the thickness of the first conductor is approximately equal to the thickness of the second electrical conductor and being approximately one-half the thickness of the third electrical conductor.

With regard to claim 4, Wen et al. and Zhao et al. disclose the first, second and third electrical conductors consist essentially of copper [see Col. 3, lines 5-14 and 53-65].

With regard to claim 5, Wen et al. taught the invention substantially as claimed, including the passive electrical device as cited in the rejection of claim 1. Wen et al. also taught the first, second and third electrical conductors consist essentially of copper. Wen et al. did not specifically teach the second electrical conductor consists essentially of aluminum. However, Zhao et al. taught a second electrically conductor (52) consists essentially of aluminum or copper [see Figures 8-9, Col. 3, lines 56-57]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second electrical conductor of Wen et al. consists essentially of aluminum, such as taught by Zhao et al. because aluminum and copper are commonly used to form the conductor for they have lower resistance, and they are interchangeable.

With regard to claim 6, Wen et al. and Zhao et al. disclose each of the first and second electrical conductors has a respective thickness in a range of approximately five to 20 microns (within the range of approximately two to approximately 32 microns) [see Col. 3, lines 5-14 and 53-65].

With regard to claim 7, Wen et al. and Zhao et al. disclose the third electrical conductor has the thickness in a range of approximately five to 10 microns (within the range of approximately two to approximately ten microns) [see Col. 3, lines 39-41, note that the third conductor 26 is formed in the dielectric layer 24 having the thickness as claimed].

With regard to claim 8, Wen et al. and Zhao et al. disclose the second electrical conductor has a substantially uniform thickness in a range of approximately five to 20 microns (within the range of approximately four to approximately six microns) [see Col. 3, lines 5-14 and 53-65].

5. Claims 9, 10, 11, 13, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Zhao et al. (PN 5,861,647, of record) and further in view of Johnson et al. (PN 6,534,374, of record).

With regard to claim 9, Wen et al., as shown in Figure 3 and 13, the inductor device comprising:  
a semiconductor substrate (14);  
first, second and third electrical conductors (24,26,28) provided on the substrate, wherein the first and second electrical conductors each has a thickness which is approximately equal [see Figures 3 and 13, Col. 3, lines 12-14 and 61-64].

Wen et al. discloses the third electrical conductor has a thickness in a range of approximately 5 to 10 microns [see Col. 3, lines 39-41, note that the third electrical conductor 26 is formed in the dielectric layer 24 having the thickness as claimed]. Wen et al. does not disclose the thickness of the third electrical conductor is approximately 2 to less than 5 microns. However, Zhao et al. discloses a device comprising a third electrical conductor (48) having a thickness in a range of 2.3 microns (within the range of approximately two to less than five microns) [see Figures 7-8 and Col. 3, lines 23-27, note that the third electrical conductor 48 is formed in the dielectric layer 36 which is the combination of layers 38, 40 and 42, having the thickness as claimed]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the third electrical conductor of Wen et al. having the thickness as claimed, such as taught by Zhao et al. in order to reduce the coupling capacitance between the first and second electrical conductors.

Wen et al. and Zhao et al. did not specifically teach the semiconductor substrate comprises silicon. However, Johnson et al. taught a semiconductor substrate (20) comprises silicon [see Figures 10 and 16, and Col. 5, lines 2-6]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the semiconductor substrate of Wen et al. and Zhao et al. comprising silicon, such as taught by Johnson et al. because silicon is one of the materials that is commonly used to form the substrate.

With regard to claim 10, Wen et al., Zhao et al. and Johnson et al. taught the substrate comprises silicon and germanium [see Col. 5, lines 2-6].

With regard to claim 11, Wen et al., Zhao et al. and Johnson et al. taught the substrate comprises silicon on insulator substrate [see Col. 5, lines 2-6].

With regard to claim 13, Wen et al., Zhao et al. and Johnson et al. taught the second electrical conductor is disposed over the first electric conductor [see Figures 8 and 13].

With regard to claim 14, Wen et al., Zhao et al. and Johnson et al. taught the first and second electrical conductors are spiral shaped [see Figure 2].

With regard to claim 15, Wen et al., Zhao et al. and Johnson et al. taught each of the first and the second electrical conductors has a sheet resistivity, the sheet resistivity of the first electrical conductor being approximately equal to the sheet resistivity of the second electrical conductor.

Note that the first and the second conductors comprise the same material (copper), it is inherent that the sheet resistivity of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 5-14 and 53-65].

6. Claims 9, 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wen et al. (PN 6,083,802, of record) in view of Zhao et al. (PN 5,861,647, of record) and further in view of Ito (PN 4,758,896).

With regard to claim 9, Wen et al. taught the invention substantially as claimed, including the inductor device, the inductor device comprising:

a semiconductor substrate (14);

first, second and third electrical conductors (24,26,28) provided on the substrate, wherein the first and second electrical conductors each has a thickness which is approximately equal [see Figures 3 and 13, Col. 3, lines 12-14 and 61-64].

Wen et al. discloses the third electrical conductor has a thickness in a range of approximately 5 to 10 microns [see Col. 3, lines 39-41, note that the third electrical conductor 26 is formed in the dielectric layer 24 having the thickness as claimed]. Wen et al. does not disclose the thickness of the third electrical conductor is approximately 2 to less than 5 microns. However, Zhao et al. discloses a device comprising a third electrical conductor (48) having a thickness in a range of 2.3 microns (within the range of approximately two to less than five microns) [see Figures 7-8 and Col. 3, lines 23-27, note that the third electrical conductor 48 is formed in the dielectric layer 36 which is the combination of layers 38, 40 and 42, having the thickness as claimed].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the third conductor of Wen et al. having the thickness as claimed, such as taught by Zhao et al. in order to reduce the coupling capacitance between the first and second electrical conductors.

Wen et al. and Zhao et al. did not specifically teach the semiconductor substrate comprises silicon. However, Ito taught a semiconductor substrate (10) comprises silicon [see Figures 1 and 3, and Col. 8, lines 9-36]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the semiconductor substrate of Wen et al. and Zhao et al. comprising silicon, such as taught by Ito because silicon is one of the materials that is commonly used to form the substrate.

With regard to claim 12, Wen et al., Zhao et al. and Ito taught the substrate comprises silicon-on-sapphire substrate [see Col. 8, lines 9-36].

With regard to claim 13, Wen et al., Zhao et al. and Ito taught the second electrical conductor is disposed over the first electric conductor [see Figures 8 and 13].

With regard to claim 15, Wen et al., Zhao et al. and Ito taught each of the first and the second electrical conductors has a sheet resistivity, the sheet resistivity of the first electrical conductor being approximately equal to the sheet resistivity of the second electrical conductor. Note that the first and the second conductors comprise the same material (copper), it is inherent that the sheet resistivity of the first conductor is approximately equal to that of the second conductor [see Col. 3, lines 5-14 and 53-65].

***Response to Arguments***

7. Applicant's arguments filed 06/30/03 have been fully considered but they are not persuasive.

It is argued, at page 6 of the Remarks, that none of the cited art teaches the third has a thickness in a range of approximately two to less than five microns, as recited in claims 1 and 9. This argument is not convincing because Zhao et al. discloses the third conductor (48) has a thickness in a range of 2.3 microns (within the range of approximately two to less than five microns) [see Col. 3, lines 23-27, note that the third conductor 48 is formed in the dielectric layer 36 which is

the combination of layers 38, 40 and 42, having the thickness as claimed]. Therefore, Applicants' claims 1 and 9 do not distinguish over the Zhao et al. reference.

*Conclusion*

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular

communications and (703) 308-7722 for After Final communications, or (703) 872-9306 for Central Fax Number.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

September 8, 2003

Hung Vu

Hung Vu

Patent Examiner